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Title: BLOCK SPLITTING ASSEMBLY AND METHOD

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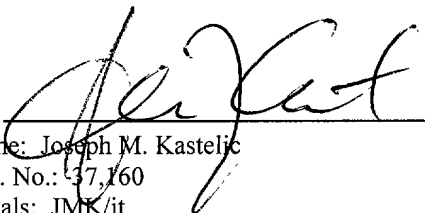
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CLAIMS AS FILED

Number of Claims Filed		In Excess of:		Number Extra		Rate		Fee
Basic Filing Fee								\$710.00
Total Claims								
61	-	20	=	41	x	18.00	=	\$738.00
Independent Claims								
3	-	3	=	0	x	0.00	=	\$0.00
MULTIPLE DEPENDENT CLAIM FEE								\$0.00
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BLOCK SPLITTING ASSEMBLY AND METHOD**Field of the Invention**

5 The invention relates generally to manufacture of masonry block. More specifically, it relates to equipment and processes for the creation of decorative faces on masonry block. Even more specifically, the invention relates to equipment and processes for producing roughened textures and the appearance of weathered or rock-like edges on masonry block.

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Background of the Invention

The process of splitting a masonry block to create a rock-like appearance on the exposed face of the block is known. See, for example, Besser, U.S. Patent No. 1,534,353, which discloses the manual splitting of blocks using a hammer and chisel. Automated equipment to split block is well-known, and generally includes a
15 splitting table comprising a supporting table and one or more hydraulically-actuated splitting blades. These machines are useful for the high-speed processing of blocks. They produce a rock-face finish on the blocks. The edges of the faces are generally well-defined, i.e., "sharp".

It is sometimes desirable to produce a concrete product that has edges
20 which appear to be weathered. This has been a desired look for concrete pavingstones for sometime. Recently, it has become desirable to create the weathered look on the decorative face of concrete retaining wall blocks. The common process for producing the weathered look on pavers is to "tumble" the pavers in a rotary drum to knock off their sharp edges. This process can be used with some retaining wall blocks, as well,
25 provided that the blocks do not have any features, such as integral concrete locator flanges, that would be damaged by the tumbling process. Tumbling is not an option with such blocks. The problem with the tumbling process is that it is costly. The process requires the capital investment in a tumbling apparatus, and the upkeep of that

equipment. In addition, the pavers or blocks must be removed from the production line, tumbled, and then reassembled into suitable cubes for transportation. This makes the process labor-intensive.

Another option is to use a hammermill to attack the face of the block with various hammers. This option can slow down production, if it is done "in line", because the process can only move as fast as the hammermill can operate on each block, and the block may need to be manipulated-flipped over and or rotated-to attack all of its edges.

Accordingly, there is a need for equipment and a process that will create the appearance of weathered edges on retaining wall block, in such a manner that it will not slow down the production line, will not add costly equipment to the line, will not be labor-intensive, and will not have high cull rates when processing blocks with integral locator flanges or other similar features.

Summary of the Invention

In accordance with a first aspect of the invention, there is provided a block splitter assembly comprising first and second opposed splitting blade assemblies, each of the first and second splitting blade assemblies comprising respective first and second splitting blades and one or more projections positioned adjacent to each of the first and second blades.

In accordance with a second aspect of the invention, there is provided a block splitter comprising first and second opposed splitting blade assemblies, each of the first and second opposed splitting blade assemblies comprising a plurality of projections.

In accordance with another aspect of the invention, there is provided a masonry block splitter comprising first and second opposed splitting blade assemblies, the first blade assembly comprising a first splitting blade having first and second sides, said first blade assembly comprising a plurality of projections adjacent the first splitting blade first side and a plurality of projections adjacent the first splitting blade second side, the second blade assembly comprising a second splitting blade having first and second sides, the second blade assembly comprising a plurality of projections adjacent

the second splitting blade first side and a plurality of projections adjacent the second splitting blade second side.

In accordance with a further aspect of the invention, there is provided a method of splitting masonry block using a masonry block splitter, comprising first and second opposed splitting blade assemblies, said first blade assembly comprising a first splitting blade having first and second sides, said first blade assembly comprising a plurality of projections adjacent said first splitting blade first side and a plurality of projections adjacent said first splitting blade second side, said second blade assembly comprising a second splitting blade having first and second sides, said second blade assembly comprising a plurality of projections adjacent said second splitting blade first side and a plurality of projections adjacent said second splitting blade second side, said method comprising the step of striking the masonry block with said first and second opposed splitting blade assemblies.

In another aspect of the invention, a gripper assembly is employed to hold the work piece together from the sides during splitting. The gripper assembly could optionally include side knives or projections.

Brief Description of the Drawings

Figure 1 is a partial perspective view of a block splitting machine using the block splitter blade assembly of the invention.

Figure 2A is a top plan view of one portion of a splitting blade assembly in accordance with the invention.

Figure 2B is a top plan view of one portion of a splitting blade assembly also showing protrusion of various diameter positioned in a random manner.

Figure 2C is a top plan view of one portion of a splitting blade assembly in accordance with a further alternative embodiment of the invention comprising protrusions which are random connected and unconnected panels.

Figure 3 is a side elevational view of an alternative embodiment of a protrusion in accordance with the invention.

Figure 4A is a side elevational view of a further alternative embodiment of a protrusion in accordance with the invention.

Figure 4B is a side elevational view of another alternative embodiment of the invention depicting protrusions of varying height.

5 Figure 5 is a perspective view of a split work piece (forming two masonry blocks), which was split using the splitter blade assembly of the invention.

Figure 6 is a top plan view of a masonry block split using the splitter blade assembly of the invention.

10 Figure 7 is a front elevational view of the masonry block depicted in Figure 6.

Figure 8 is a partial sectional end view of an alternative embodiment of a top splitter blade assembly.

Figure 9 is a partial sectional end view of an alternative embodiment of a bottom splitter blade assembly.

15 Figure 10 is a top plan view of a portion of the Figure 9 embodiment of a bottom splitter blade assembly shown in relation to a work piece.

Figure 11 is a top plan view of a gripper assembly according to the present invention, and another alternative embodiment of a bottom splitter blade assembly, shown in relation to a work piece.

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Detailed Description of the Preferred Embodiment

Attention is now directed to the figures where like parts are identified with like numerals through several views. In Figure 1, a conventional block splitting machine modified in accordance with invention is depicted, in part, showing in
25 particular the block splitter assembly 10. Generally, block splitting machines may be obtained from Lithibar Co., located in Holland, Michigan. In particular, the Lithibar Co. 6386 was used in practicing the invention. The block splitter assembly generally has opposed first 12 and second 22 splitting blade assemblies. The first splitting blade assembly 12 is positioned at the bottom of the block splitter 10 and as depicted includes

a splitting blade 14 and a number of protrusions positioned on either side and adjacent to the blade.

The invention may be used with any variety of blocks molded or formed through any variety of processes including those blocks and processes disclosed in U.S. Patent No. 5,827,015 issued October 27, 1998, U.S. Patent No. 5,017,049 issued May 21, 1991 and U.S. Patent No. 5,709,062 issued January 20, 1998.

An upper or second splitting blade assembly 22 may also be seen in Figure 1. The second splitting blade assembly 22 also includes a splitting blade 24 and a plurality of projections 26 located on either side of the blade 24. The second splitting blade assembly may be attached to the machine's top plate 30 through a blade holder 28. The position of the work piece 40, (shown in phantom), within the block splitter may be seen in Figure 1, in the ready-to-split position.

As can be seen in Figure 2A, the splitting blade assembly 12 is generally comprised of a number of projections 16 positioned adjacent to blade 14 and on either side of the blade 14. As shown, the projections 16 on the first side of the blade are staggered in relationship to the projections 16' on the second side of the blade. The projections on either side of the blade may also be aligned depending upon the intent of the operator.

As can be seen in Figure 2B, the protrusions 16 may be used without a splitting blade. The protrusions 16 may also be varied in diameter or perimeter, (if not round), and placed randomly on the splitting assembly 12. Any number of ordered or random patterns of protrusions 16 may be created using regular or irregular spacing depending on the effect to be created in the split block. Figure 2C shows a further alternative embodiment of the invention where plates 16" are attached to either, or both, assemblies 12 and 22. As can be seen these plates may be configured in random order and left unconnected across the surface of the assembly 12. The invention has been practiced using steel plates about four inches long welded to the assembly to provide a number of partially connected protrusions 16" about two inches high.

As shown, the projections 16 and 16' may have a rounded shape. However, the shape of the projections may also be pyramidal, cubic, or pointed with

one or more points on the top surface of the projection. Here again the relative position of the work piece 40 is shown in phantom outline.

Generally, the protrusions may have a diameter of about $1/2$ to 1 and $1/4$ inches and may be attached by welding, screwing or other suitable means. The height of the protrusions may be about 1 and $1/4$ inches and varied about $3/4$ of an inch shorter or taller depending upon the affect to be created in the block at splitting. Attaching the protrusions by threading or screwing allows easy adjustment of protrusion height.

The relative height of the projection and blade may also be varied depending upon the effect that is to be created in the block split according to the invention. Specifically, as can be seen in Figure 3 the relative height of the blade 14 may be less than the relative height of the projection 16. Alternatively, as can be seen in Figure 4 the relative height of the blade may be greater than the height of the projections 26. Generally, we have found with the first splitting blade assembly that X may range from about $1/8$ to about $3/8$ of an inch beyond the first blade. With regard to the second splitting blade assembly, X' may range from about $1/16$ to $1/8$ of an inch beyond the height of the plurality of the projections.

Protrusions 16 such as those depicted in Fig. 2A have been found useful having a diameter of about 1 and $1/4$ inches and when used with a blade 14 having a height of about $1/8$ of an inch above the blade in the first or lower assembly and $1/8$ of an inch below the blade in the second or upper assembly. Overall, the height of the protrusion may vary up or down about $3/8$ of an inch relative to the height of the blade.

In operation, the work piece is generally centered in the block splitter according to known practices as seen in Figures 1 and 2. The block splitter is then activated resulting in the first and second opposing splitting blade assemblies converging on, and striking, the work piece 40. In operation, the first and second splitting blade assemblies may travel anywhere from about $1/4$ to one inch into the top and bottom surfaces of the work piece. The work piece 40 is then split resulting in an uneven patterning on the split edges 46 and 46' of the resulting blocks, 42 and 44, Figure 5. As depicted, the work piece 40' is split in two. However, it is possible and within the scope of the invention to split the work piece into more than two pieces.

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The distance traveled by the protrusions 16 into the work piece may be varied by adjusting the limit switches on the machine and, in turn, varying the hydraulic pressure with which the splitting assembly acts. Generally, the splitting assemblies act on the block with a pressure ranging from about 600 to 1000 psi, and preferably about
5 750 to 800 psi.

As will be well understood by one of skill in the art, the splitting machine may include opposed hydraulically activated side knife assemblies (not shown) which impinge upon the block with the same timing and in the same manner as the opposed top and bottom assemblies. Projections 16 may also be used to supplement or
10 replace the action of the side knives. For example, side knives similar to the upper splitting blade 24 shown in Figure 8 can be employed.

Closer examination of block 44 after splitting shows the formation of exaggerated points of erosion in the front, split surface 46 of the block 44. With the block 44 depicted, both the first and second blade assemblies 12 and 22 comprised
15 protrusions 16 and 26, respectively. As a result, depressions 48 and 50 were formed in the front, split surface 46 of the block 44, adjacent the upper 52 and lower 54 respective surface of the block 44.

The magnitude of the indentations, 48 and 50, or points of erosion is far greater than that which is caused by conventional splitting blades and may be varied by
20 varying the prominence of the protrusions 16 and 26, (height and size), relative to the height and thickness of the blade. In one embodiment of the invention masonry block may be split with only a row or rows of protrusions 16 and 26 without a blade 14 and 24.

Referring to Figures 8 and 9, alternative embodiments of a top splitting
25 blade assembly 22 and bottom splitting blade assembly 12, respectively, are shown. It has been found that more massive blades 14, 24 having projections 16, 26 thereon create a more desirable block face appearance. Blades 14, 24 include a central cutting edge 21 and surfaces 19, 29 extending outwardly therefrom. Surfaces 19, 29 are at a blunt angle so as to make the top and bottom edges of the block face more rounded and

therefore rock-like, preferably at an angle α between 0° and 30° relative to horizontal, most preferably 23° .

Blades 14, 24 include projections 16, 26 that are adjustable and removable. In this way, the same blade assembly can be used for splitting different
5 block configurations by changing the number, location, spacing and height of the projections. Projections 16, 26 are preferably threaded into corresponding threaded openings 17, 27 for adjustment, although other height adjustment means could be employed. The top surface of projections 16, 26 is jagged, comprising many pyramids in a checkerboard pattern. Projections such as these can be obtained from Fairlane
10 Products Co. It will be understood that a variety of other projection top surface configurations could be employed. The height of the top surface of projections is preferably a distance X' below the top of cutting edge 21, 31, most preferably 0.040 inch below. As discussed above with respect to other embodiments, the projections may extend further below, or some distance above, the top of the blade, within the
15 principles of the invention. The projections shown are $3/4$ inch diameter with a 10 thread/inch pitch, and are 1.50 inches long. Diameters between 0.50 and 1.0 inch are believed preferable. The loose block material from the splitting process entering the threads, in combination with the vertical force of the splitting strikes, are considered sufficient to lock them in place.

20 The preferred top blade assembly 22 is 2.5 inches wide. Projections 26 extend perpendicularly from blade surfaces 29 and therefore strike the working piece at an angle.

The preferred bottom blade assembly 12 is 4.0 inches wide. Projections 16 extend upwardly from shoulders 23 on opposite sides of blade surfaces 19. This
25 configuration breaks away more material and creates a more rounded rock-like top edge (the work piece is typically inverted) of the split blocks. Blade assembly 12 could optionally include projections 16 on blade surfaces 19, as shown in Figure 11.

In operation, the blade assemblies of Figures 8 and 9 are used together and in the same manner described above with respect to cutting depth and hydraulic

pressures. It will be understood that the bottom blade assembly could be used on top, and the top blade assembly could be used on the bottom.

Referring now to Figure 10, a blade assembly according to Figure 9 is depicted positioned for striking a work piece 40. Work piece 40 comprises portions
5 which will result in small 60, medium 62 and large 64 blocks. A projection 16 is preferably placed at each corner of the three blocks 60, 62, 64 to be created, as shown. In this way, more rounded, rock-like corners are formed in the splitting process. This positioning of projections at the block corners can be used in conjunction with mold configurations that pre-form the slab at the corners so as to better achieve this effect.
10 Upper blade assembly of Figure 8 has similarly oriented projections except that they are closer to a centerline of the workpiece, as can be seen from Figure 8.

Referring now to Figure 11, a gripper assembly 70 is shown in conjunction with a work piece 40 and bottom splitting blade assembly 12. Gripper assembly 70 is employed to assist with splitting certain types of larger block units. It is
15 mounted via mounting head 71 on the existing side-knife cylinders of the splitting machine. Rubber shoes 72 are configured to conform to the corresponding outer surface of work piece 40. Each gripper assembly 70 moves in and out laterally, as indicated by arrows, in order to grip work piece 40 from both sides. In the preferred design, assembly 70 is 3.0 inches high and rubber shoes 72 are 50-100 Durometer
20 hardness. The pressure applied by the hydraulic cylinders is the same as that for the upper and lower blades.

One benefit of this gripper assembly is improving the formation of rounded edges of a work piece made by a bottom blade. Product is moved along the manufacturing line by positioning bar 80 in the direction of the arrow shown. During
25 splitting, while the rear portion of work piece 40 is held in place by bar 80, the forward portion is free to move forwardly. Many splitting machines have a splitting action whereby the bottom blade moves to engage the product after the top blade has touched the top of the product. The initial cutting action of the top blade can begin to move the forward portion forwardly before the bottom blade has an opportunity to fully form a
30 rounded edge on the forward block with for example projections 16 and/or blade

surfaces 19. The bottom blade can also lift the work piece, which is undesirable for a number of reasons. By holding work piece 40 together during splitting, these problems are prevented.

Gripper assembly 70 can optionally include projections 16, as shown.

- 5 Projections 16 are preferably positioned slightly inside the top and bottom edges of the work piece (four projections for each gripper assembly 70) so when they strike the side of the work piece 40, more rounded block corners will be formed. The assembly can also include a side knife contained within its central cavity 73, having a blunt blade such as those described hereinabove, for forming rounded, rock-like side edges of the
- 10 split blocks. It may be necessary to include an appropriate strength spring behind the side knife in order to get the desired action from the gripper and knife.

- The above specification, examples and data provide a complete description of the manufacture and use of the composition of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope
- 15 of the invention, the invention resides in the claims hereinafter appended.

WHAT IS CLAIMED IS:

1. A block splitter assembly comprising first and second opposed splitting blade assemblies, each of said first and second splitting blade assemblies comprising respective first and second splitting blades each having a cutting edge, and a plurality of projections positioned adjacent to each of said cutting edges of said first and second blades.
2. The assembly of claim 1, wherein said plurality of projections has a rounded shape.
3. The assembly of claim 1, wherein said plurality of projections has a pyramidal shape.
4. The assembly of claim 1, wherein each of said projections comprises a top surface.
5. The assembly of claim 4, wherein at least one of said projections has a top surface comprising at least one point.
6. The assembly of claim 1, wherein said projections have a height which extends beyond said first splitting blade.
7. The assembly of claim 1, wherein said second blade has a height which extends beyond said projections.
8. The assembly of claim 6, wherein said one or more projections extend about $1/8$ to $3/8$ of an inch beyond said first blade.
9. The assembly of claim 7, wherein said second blade extends about $1/16$ to $1/8$ of an inch beyond said one or more projections.

10. The assembly of claim 1, wherein each of said splitting blades comprise a central portion having said cutting edge, and two surfaces on opposite sides of said central portion having said plurality of projections.

11. The assembly of claim 10, wherein said projections are adjustable relative to a height of said blades.

12. The assembly of claim 11, wherein said projections have threads that engage corresponding threads in said blade assembly.

13. The assembly of claim 11, wherein said projections have a jagged top surface.

14. The assembly of claim 10, wherein said surfaces of at least one of said splitting blades extend at an angle from said central portion, and said projections extend generally perpendicularly from said surfaces.

15. The assembly of claim 14, wherein said angle is between 0° and 30° relative to horizontal.

16. A block splitter comprising first and second opposed splitting blade assemblies, each of said first and second opposed splitting blade assemblies comprising a plurality of projections.

17. The splitter of claim 16, wherein said first blade assembly comprises a first splitting blade having a cutting edge and a plurality of projections on each side of said cutting edge.

18. The splitter of claim 16, wherein said second blade assembly comprises a second splitting blade having a cutting edge and a plurality of projections on each side of said cutting edge.

19. The splitter of claim 16, wherein said projections have a rounded shape.
20. The splitter of claim 16, wherein said projections have a pyramidal shape.
21. The splitter of claim 16, wherein each of said projections comprise a top surface.
22. The splitter of claim 21, wherein at least one of said projections has a top surface comprising at least one point.
23. The splitter of claim 17, wherein said projections have a height which extends above said first splitting blade.
24. The splitter of claim 18, wherein said second blade has a height which extends above said projections.
25. The splitter of claim 23, wherein said projection height extends about 1/8 to 3/8 of an inch beyond said first blade.
26. The splitter of claim 24, wherein said second blade height extends about 1/16 to 1/8 of an inch beyond said projections.
27. The splitter of claim 16, wherein each of said splitting blade assemblies comprise a central portion having a cutting edge, and two surfaces on opposite sides of said central portion having said plurality of projections.
28. The splitter of claim 27, wherein said projections are adjustable relative to a remainder of said blade assemblies.
29. The splitter of claim 28, wherein said projections have threads that engage corresponding threads in said blade assembly.

30. The splitter of claim 28, wherein said projections have a jagged top surface.

31. The splitter of claim 27, wherein said surfaces of at least one of said splitting blades extend at an angle from said central portion, and said projections extend generally perpendicularly from said surfaces.

32. The splitter of claim 31, wherein said angle is between 0° and 30° relative to horizontal.

33. A masonry block splitter comprising first and second opposed splitting blade assemblies, said first blade assembly comprising a first splitting blade having a cutting edge with first and second sides, said first blade assembly comprising a plurality of projections adjacent said first cutting edge first side and a plurality of projections adjacent said first cutting edge second side, said second blade assembly comprising a second splitting blade having a cutting edge with first and second sides, said second blade assembly comprising a plurality of projections adjacent said second cutting edge first side and a plurality of projections adjacent said second cutting edge second side.

34. The splitter of claim 33, wherein said first blade has a length and the plurality of projections adjacent said first cutting edge first side are aligned with the plurality of projections adjacent said first cutting edge second side along the length of said first blade.

35. The splitter of claim 33, wherein said second blade has a length and the plurality of projections on said second cutting edge first and second sides are aligned along the length of said second blade.

36. The splitter of claim 33, wherein said projections have a rounded shape.

37. The splitter of claim 33, wherein said projections have a pyramidal shape.

38. The splitter of claim 33, wherein each of said projections comprises a top surface.

39. The splitter of claim 38, wherein at least one of said projections has a top surface which is pointed.

40. The splitter of claim 33, wherein said first blade assembly projections have a height which extends above said first splitting blade.

41. The splitter of claim 33, wherein said second blade has a height which extends beyond said second blade assembly projections.

42. The splitter of claim 40, wherein said projection height extends about 1/8 to 3/8 of an inch beyond said first blade.

43. The assembly of claim 41, wherein said second blade height extends about 1/16 to 1/8 of an inch beyond said second blade assembly projections.

44. The splitter of claim 33, wherein each of said splitting blades comprise a central portion having said cutting edge, and two surfaces on opposite sides of said central portion having said plurality of projections.

45. The splitter of claim 44, wherein said projections are adjustable relative to a height of said blades.

46. The splitter of claim 45, wherein said projections have threads that engage corresponding threads in said blade assembly.

47. The splitter of claim 45, wherein said projections have a jagged top surface.

48. The splitter of claim 44, wherein said surfaces of at least one of said splitting blades extend at an angle from said central portion, and said projections extend generally perpendicularly from said surfaces.

49. The splitter of claim 48, wherein said angle is between 0° and 30° relative to horizontal.

50. A method of splitting masonry block using a masonry block splitter, comprising first and second opposed splitting blade assemblies, said first blade assembly comprising a first splitting blade having a cutting edge with first and second sides, said first blade assembly comprising a plurality of projections adjacent said first cutting edge first side and a plurality of projections adjacent said first cutting edge second side, said second blade assembly comprising a second splitting blade having a cutting edge with first and second sides, said second blade assembly comprising a plurality of projections adjacent said second cutting edge first side and a plurality of projections adjacent said second cutting edge second side, said method comprising the step of:

(a) striking the masonry block with said first and second opposed splitting blade assemblies.

51. The method of claim 50, wherein said first splitting blade assembly travels about 1/2 to 1 inch into the block.

52. The method of claim 50 wherein said second splitting blade assembly travels about 1/2 to 1 inch into the block.

53. The method of claim 50, wherein said second splitting blade strikes the top of the block.

54. The method of claim 50, wherein said first splitting blade strikes the bottom of the block.

55. A block resulting from the method of claim 50.

56. A block resulting from the method of claim 51.

57. A block resulting from the method of claim 52.
58. A retaining wall comprising more than one block of claim 55.
59. A retaining wall comprising more than one block of claim 56.
60. A retaining wall comprising more than one block of claim 57.
61. The method of claim 50, wherein said projections are positioned so that they strike the masonry block at corners of the blocks resulting therefrom.

Abstract

A block splitting assembly and method which uses any of a variety of protrusions to supplement or replace the action of the splitting blade in splitting and
5 dressing concrete or masonry block. A gripper assembly holds the block during splitting.

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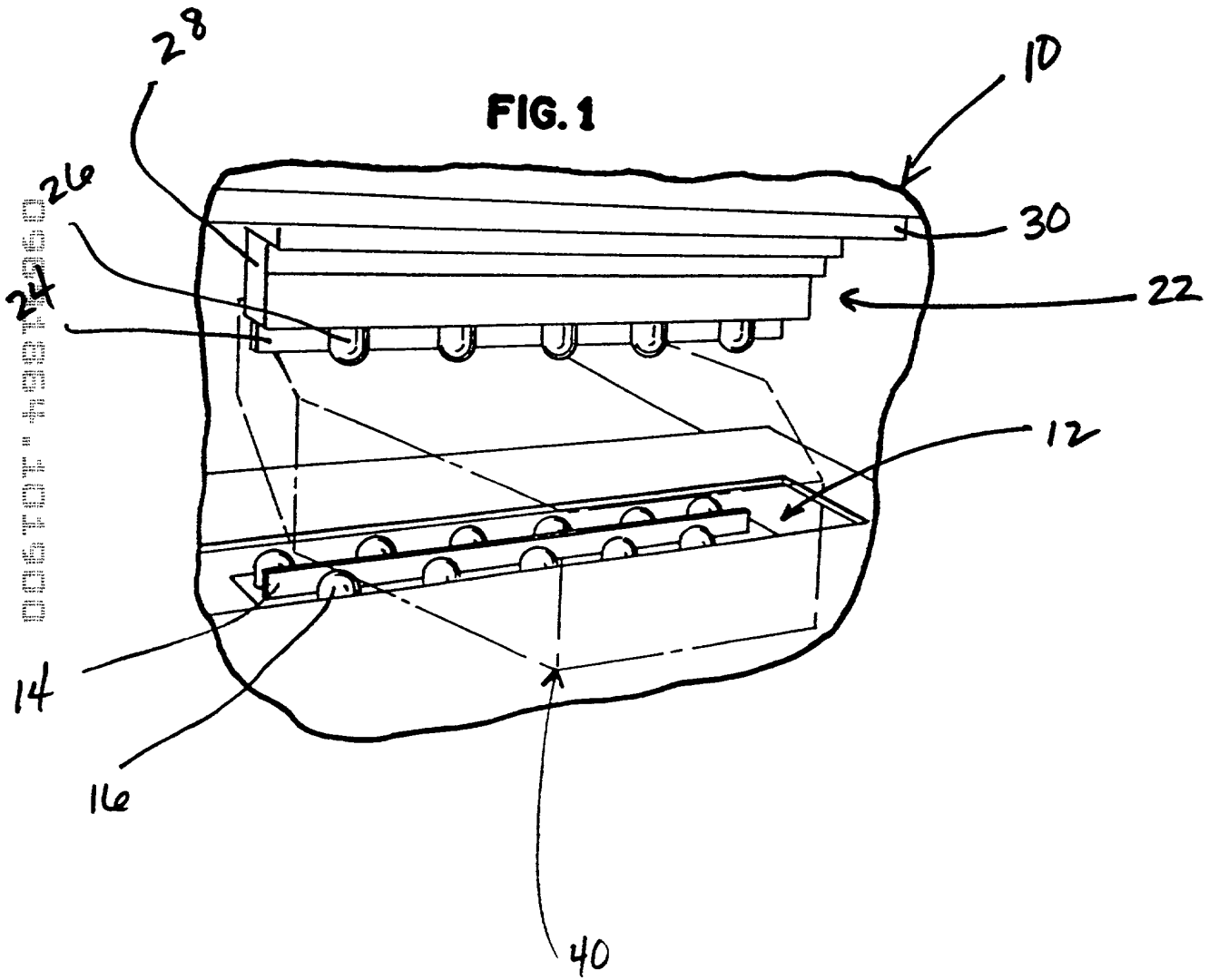
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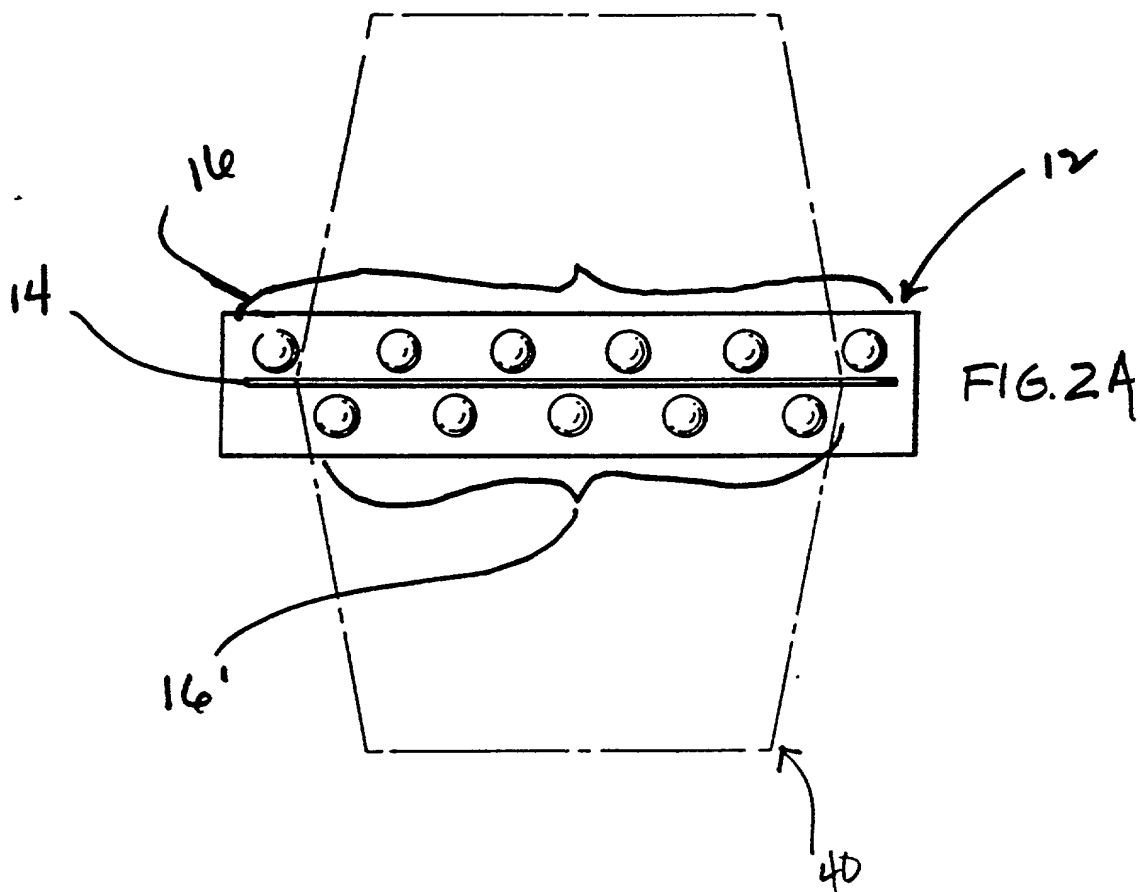
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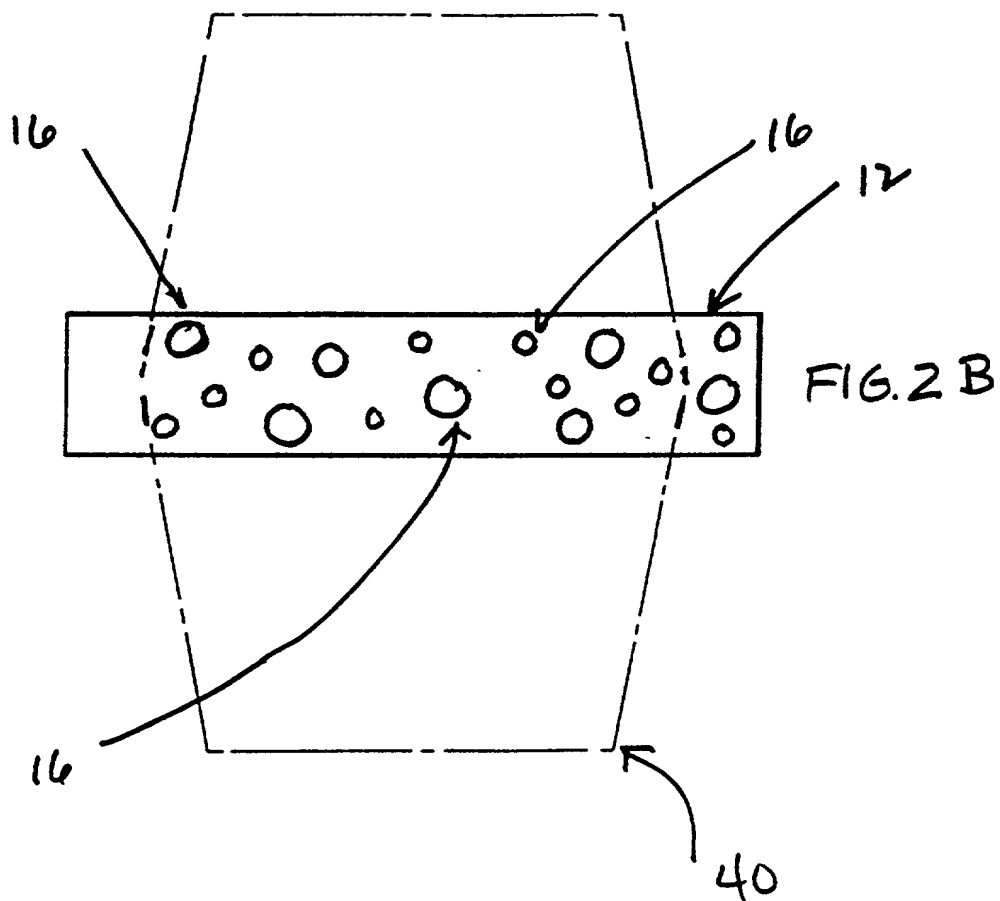
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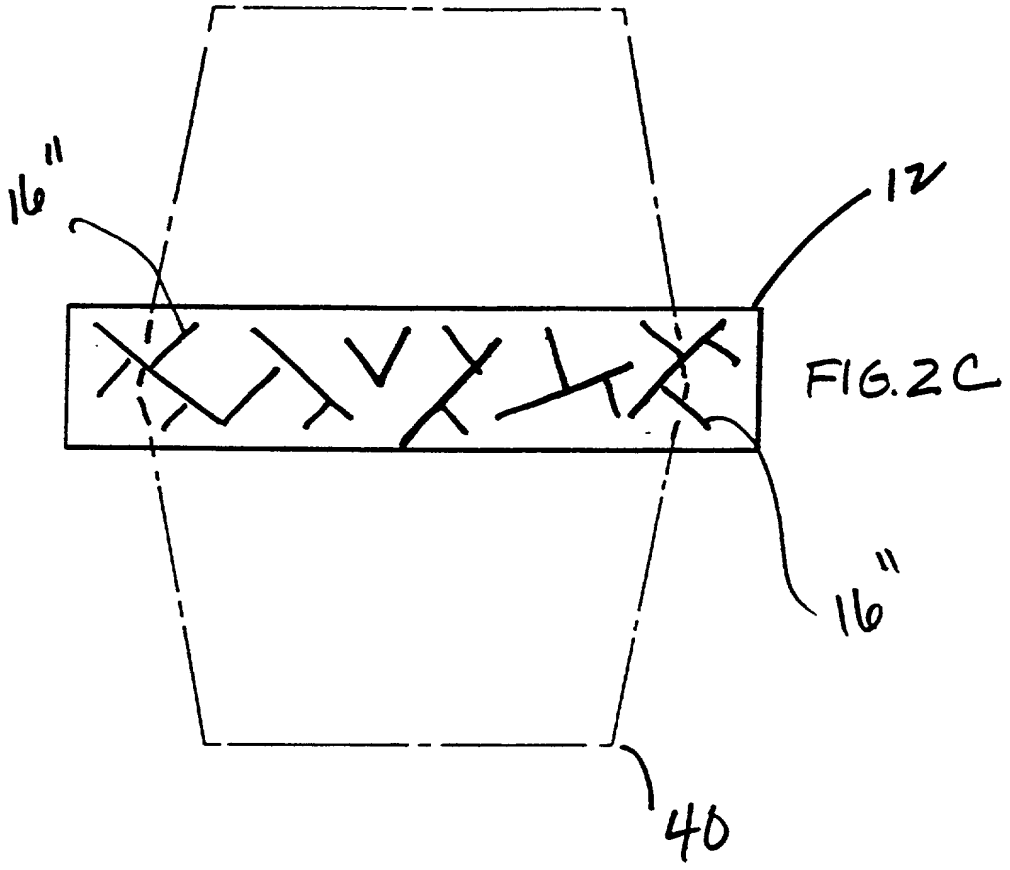
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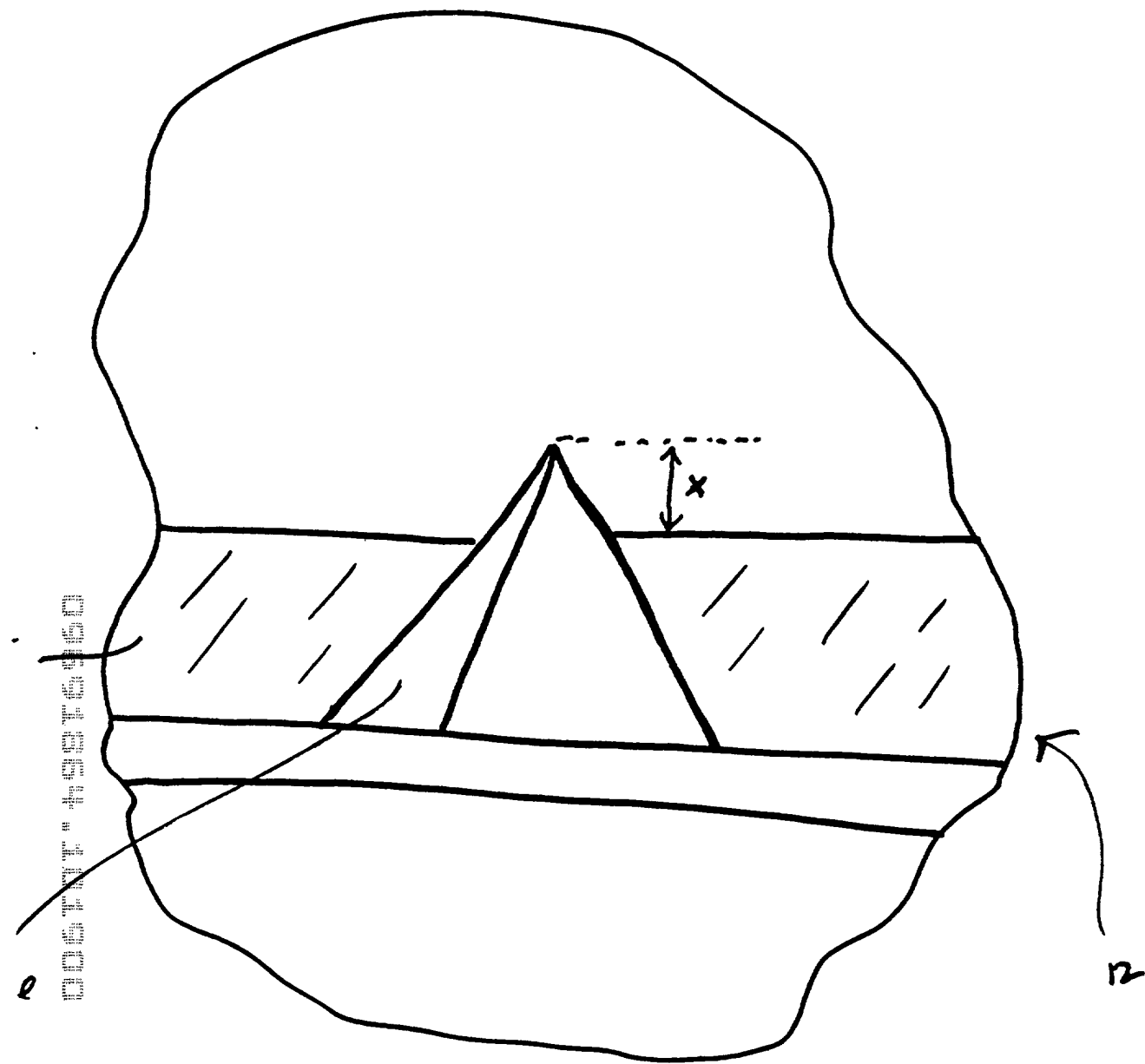
FIG. 1











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FIG. 4A

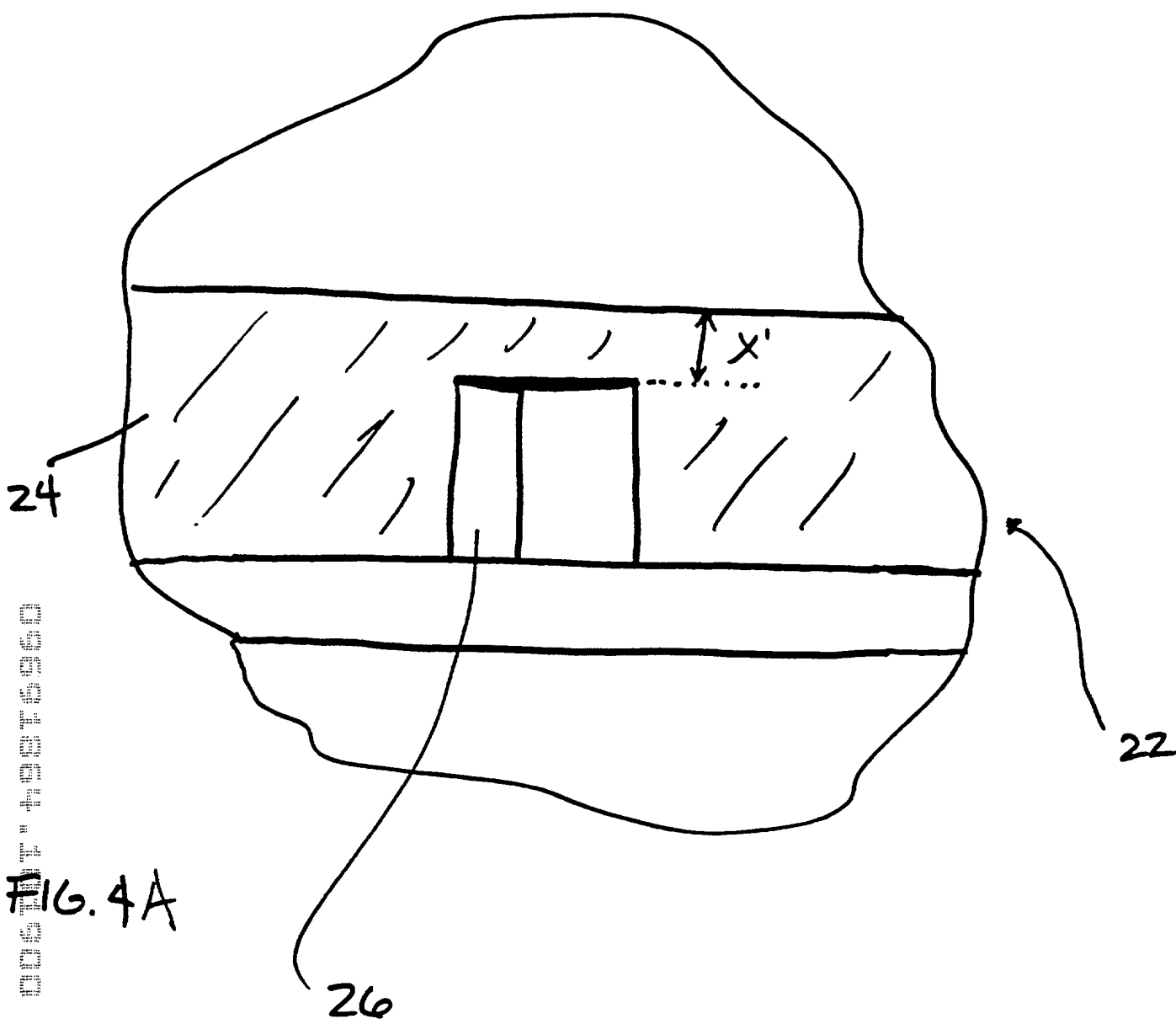
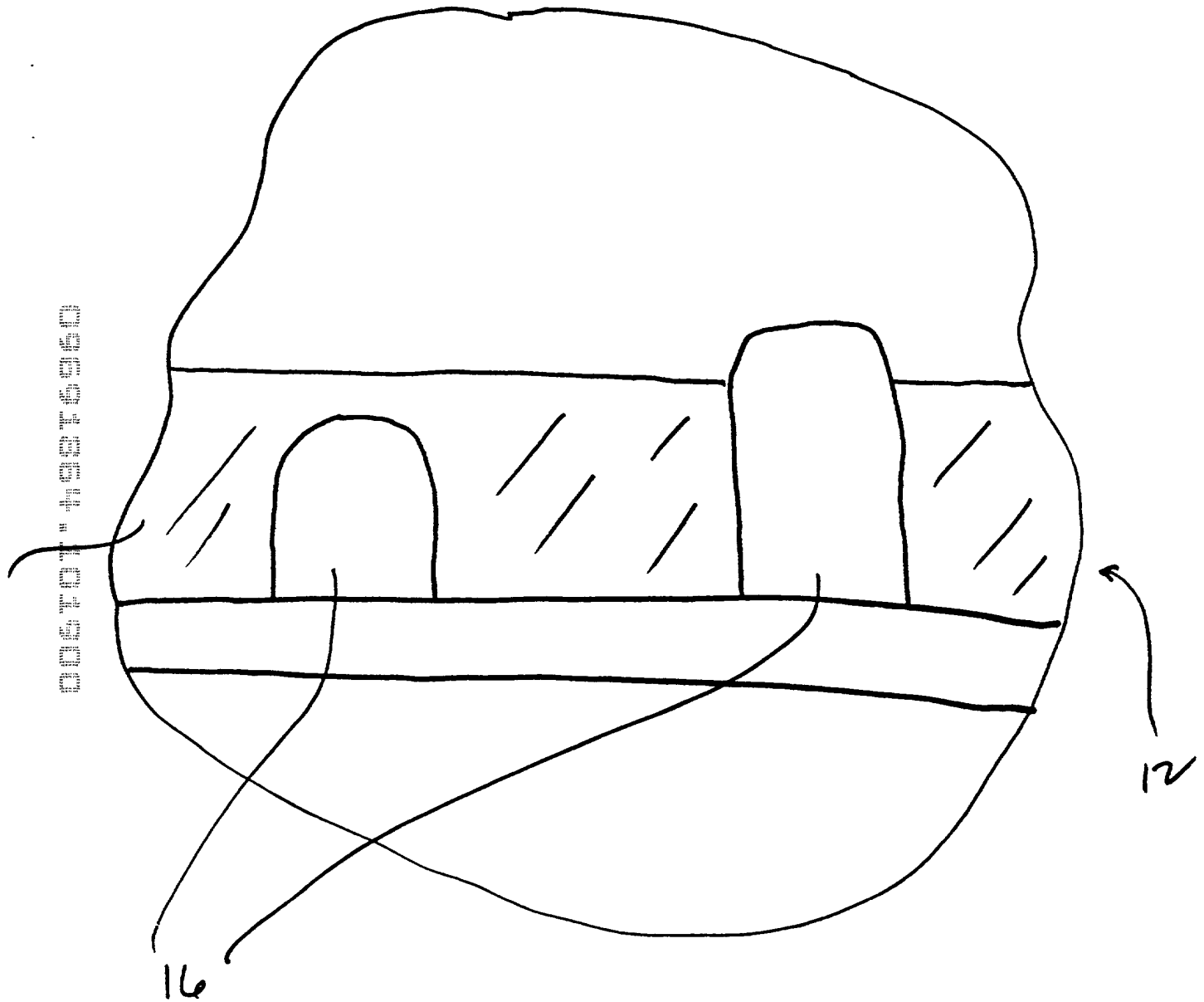
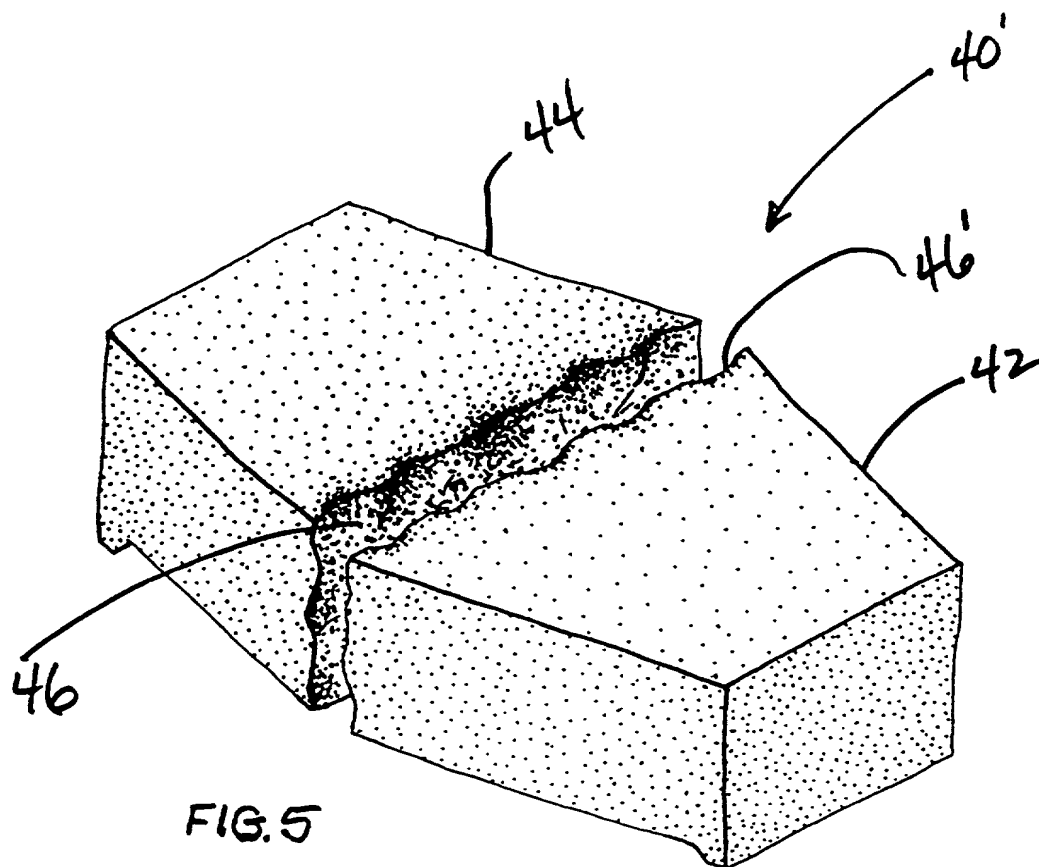


FIG. 4B





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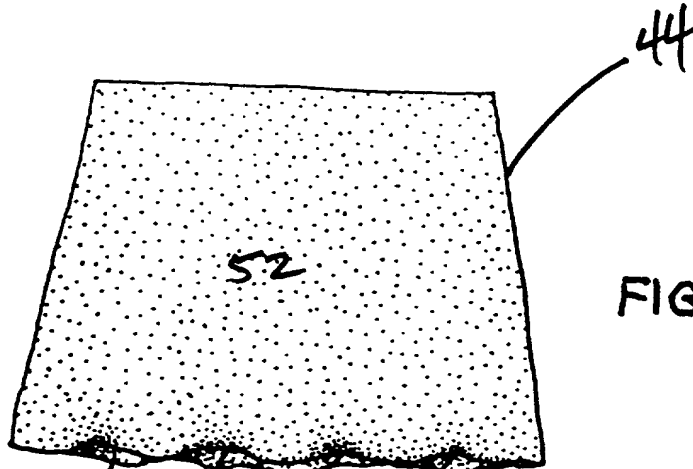


FIG. 6

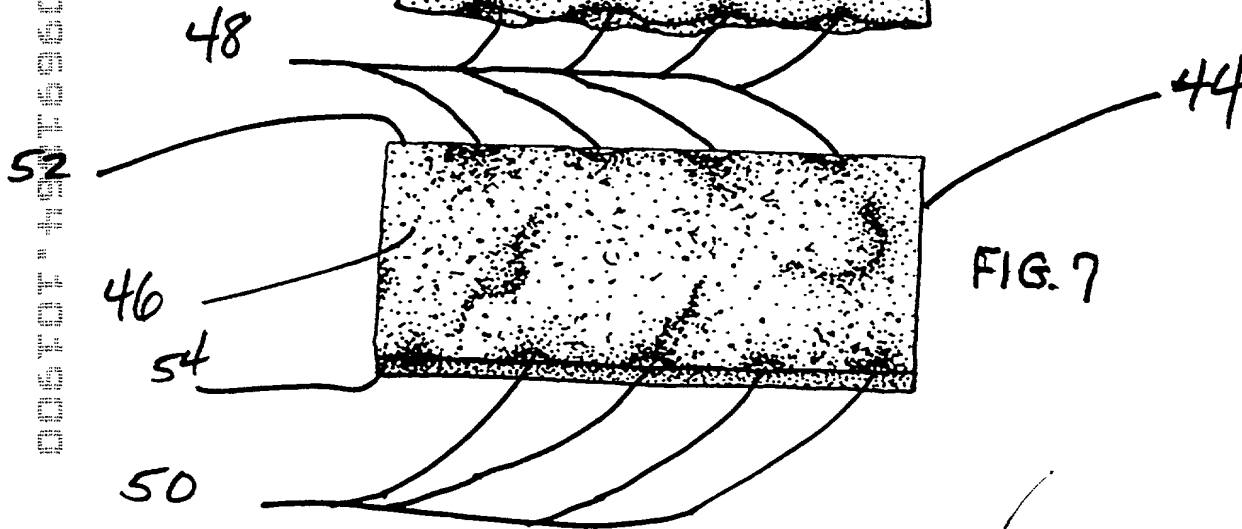


FIG. 7

FIG. 8

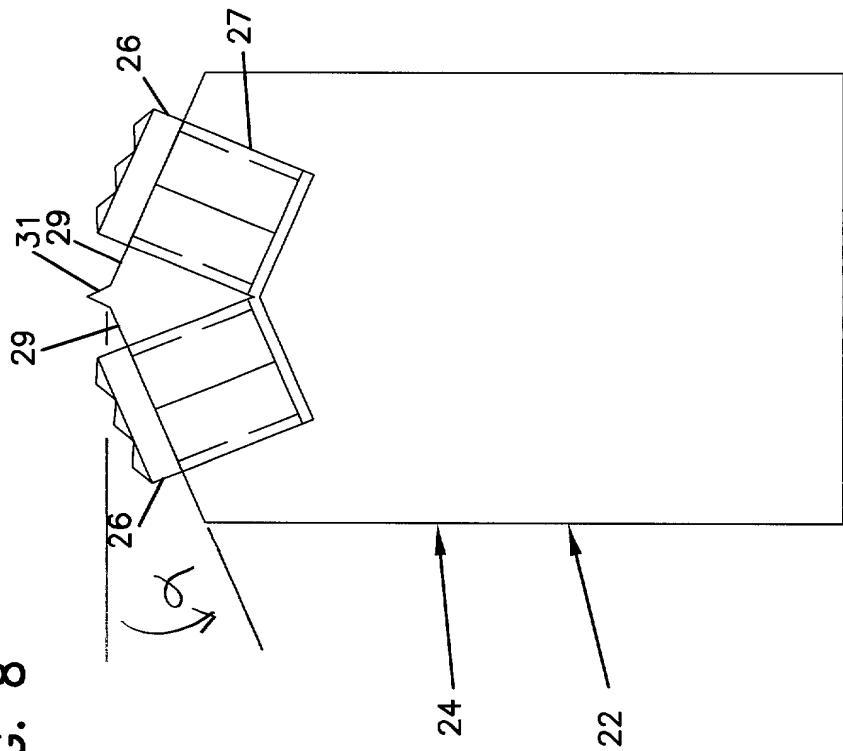


FIG. 10

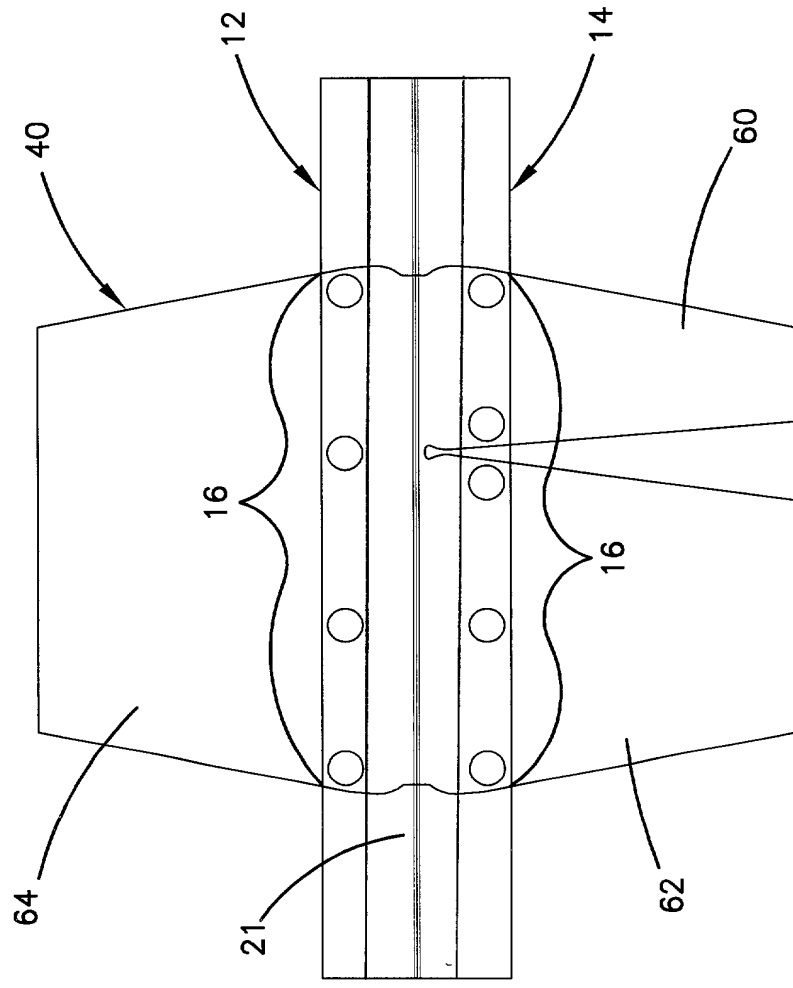
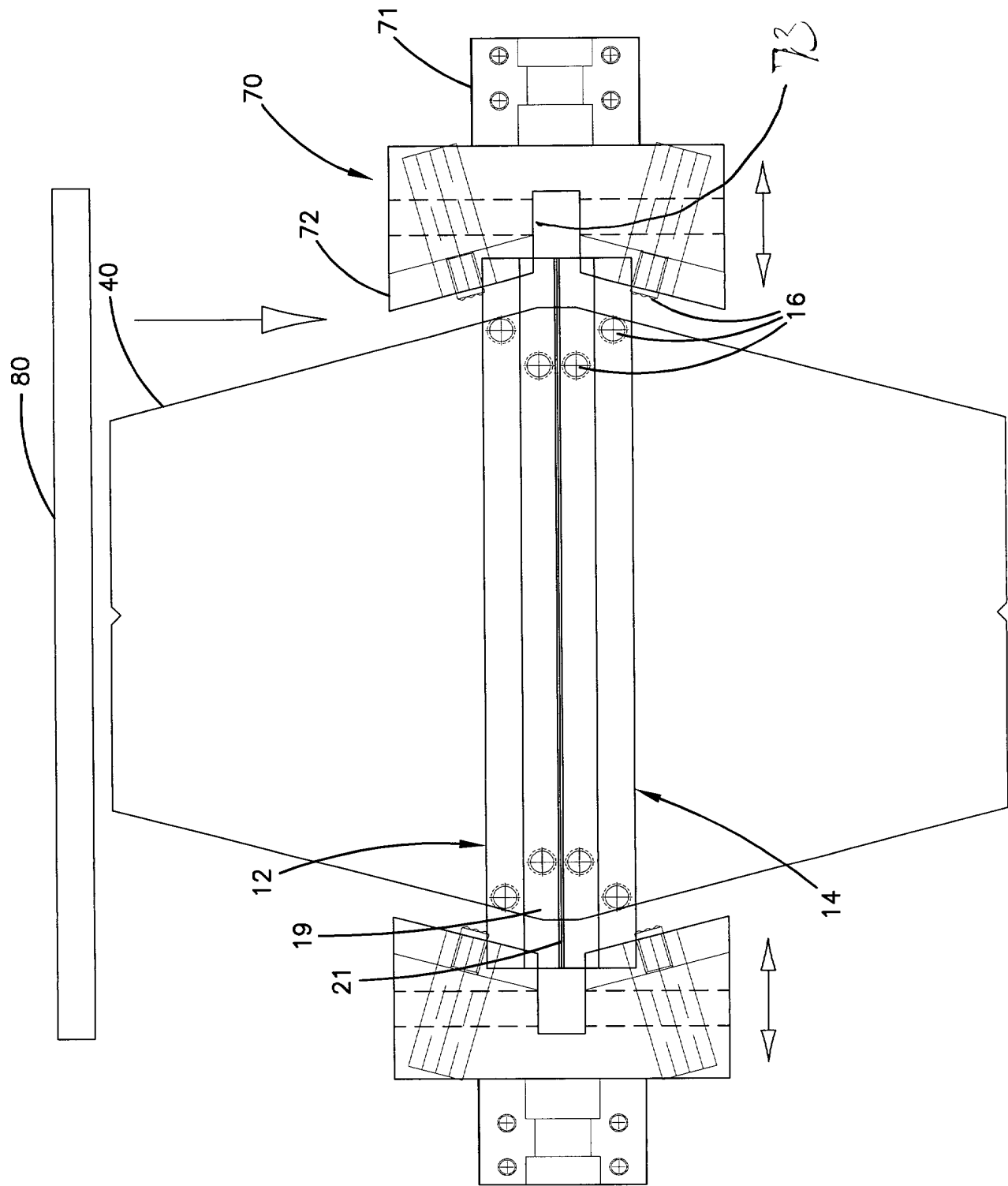


FIG. 11



MERCHANT & GOULD P.C.

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **BLOCK SPLITTING ASSEMBLY AND METHOD**

The specification of which

- a. ☒ is attached hereto
b. ☒ is entitled **BLOCK SPLITTING ASSEMBLY AND METHOD**, having an attorney docket number **3616.177USI1**.
c. ☐ was filed on _____ as application serial no. _____ and was amended on _____ (if applicable) (in the case of a PCT-filed application) described and claimed in international no. _____ filed _____ and as amended on _____ (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56 (attached hereto).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

- a. ☒ no such applications have been filed.
b. ☐ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
ALL FOREIGN APPLICATION(S), IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

U.S. PROVISIONAL APPLICATION NUMBER	DATE OF FILING (Day, Month, Year)

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Albrecht, John W.	Reg. No. 40,481	Lacy, Paul E.	Reg. No. 38,946
Anderson, Gregg I.	Reg. No. 28,828	Larson, James A.	Reg. No. 40,443
Ansems, Gregory M.	Reg. No. 42,264	Lasky, Michael B.	Reg. No. 29,555
Batzli, Brian H.	Reg. No. 32,960	Liepa, Mara E.	Reg. No. 40,066
Beard, John L.	Reg. No. 27,612	Lindquist, Timothy A.	Reg. No. 40,701
Black, Bruce E.	Reg. No. 41,622	Lynch, David W.	Reg. No. 36,204
Blasdel, Thomas L.	Reg. No. 31,329	Marschang, Diane L.	Reg. No. 35,600
Bogucki, Raymond A.	Reg. No. 17,426	McDaniel, Karen D.	Reg. No. 37,674
Bruess, Steven C.	Reg. No. 34,130	McDonald, Daniel W.	Reg. No. 32,044
Byrne, Linda M.	Reg. No. 32,404	McIntyre, Iain A.	Reg. No. 40,337
Carlson, Alan G.	Reg. No. 25,959	Mueller, Douglas P.	Reg. No. 30,300
Caspers, Philip P.	Reg. No. 33,227	Nelson, Albin J.	Reg. No. 28,650
Chiapetta, James R.	Reg. No. 39,634	Pauly, Daniel M.	Reg. No. 40,123
Clifford, John A.	Reg. No. 30,247	Phillips, John B.	Reg. No. 37,206
Cochran, William W.	Reg. No. 26,652	Plunkett, Theodore	Reg. No. 37,209
Daignault, Ronald A.	Reg. No. 25,968	Pytel, Melissa J.	Reg. No. 41,512
Daley, Dennis R.	Reg. No. 34,994	Reich, John C.	Reg. No. 37,703
Dalglish, Leslie E.	Reg. No. 40,579	Reiland, Earl D.	Reg. No. 25,767
Daulton, Julie R.	Reg. No. 36,414	Rittmaster, Ted R.	Reg. No. 32,933
DeVries Smith, Katherine M.	Reg. No. 42,157	Schmaltz, David G.	Reg. No. 39,828
DiPietro, Mark J.	Reg. No. 28,707	Schuman, Mark D.	Reg. No. 31,197
Edell, Robert T.	Reg. No. 20,187	Schumann, Michael D.	Reg. No. 30,422
Epp Ryan, Sandra	Reg. No. 39,667	Scull, Timothy B.	Reg. No. 42,137
Funk, Steven R.	Reg. No. 37,830	Sebald, Gregory A.	Reg. No. 33,280
Glance, Robert J.	Reg. No. 40,620	Skoog, Mark T.	Reg. No. 40,178
Golla, Charles E.	Reg. No. 26,896	Soderberg, Richard	Reg. No. P- 43,352
Gorman, Alan G.	Reg. No. 38,472	Sumner, John P.	Reg. No. 29,114
Gould, John D.	Reg. No. 18,223	Sumners, John S.	Reg. No. 24,216
Gregson, Richard	Reg. No. 41,804	Tellekson, David K.	Reg. No. 32,314
Gresens, John J.	Reg. No. 33,112	Trembath, Jon R.	Reg. No. 38,344
Hamre, Curtis B.	Reg. No. 29,165	Underhill, Albert L.	Reg. No. 27,403
Hillson, Randall A.	Reg. No. 31,838	Vandenburgh, J. Derek	Reg. No. 32,179
Holzer, Jr., Richard J.	Reg. No. 42,668	Vradenburgh, Anna M.	Reg. No. 39,868
Johnston, Scott W.	Reg. No. 39,721	Welter, Paul A.	Reg. No. 20,890
Kadievitch, Natalie D.	Reg. No. 34,196	Whipps, Brian	Reg. No. 43,261
Kastelic, Joseph M.	Reg. No. 37,160	Wickhem, J. Scot	Reg. No. 41,376
Kettelberger, Denise	Reg. No. 33,924	Williams, Douglas J.	Reg. No. 27,054
Kearl, Homer L.	Reg. No. 21,197	Witt, Jonelle	Reg. No. 41,980
Kowalchyk, Alan W.	Reg. No. 31,535	Wood, William J.	Reg. No. 42,236
Kowalchyk, Katherine M.	Reg. No. 36,848	Xu, Min S.	Reg. No. 39,536
Kubota, Glenn M.	Reg. No. 44,197		

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Merchant & Gould P.C. to the contrary.

Please direct all correspondence in this case to Merchant & Gould P.C. at the address indicated below:

Merchant & Gould P.C.
3100 Norwest Center
90 South Seventh Street
Minneapolis, MN 55402-4131

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

201	Full Name Of Inventor	Family Name SCHERER	First Given Name RONALD	Second Given Name JAMES
	Residence & Citizenship	City OAK PARK HEIGHTS	State or Foreign Country MINNESOTA	Country of Citizenship USA
	Post Office Address	Post Office Address 5703 PELLER AVENUE NORTH	City OAK PARK HEIGHTS	State & Zip Code/Country MINNESOTA 55082/USA
Signature of Inventor 201:				Date:

201

§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim;
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
- (2) Each attorney or agent who prepares or prosecutes the application; and
- (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.